What is Claimed is:

1. In a target processor, a trace apparatus comprising:

a trigger unit responsive to user and target processor state input signals, the trigger unit generating control signals in response to the input signals;

timing trace apparatus, the timing trace apparatus responsive to control signals for selectively providing timing trace streams during secondary code execution;

program counter/data trace apparatus, the program counter/data trace apparatus responsive to signals from the control apparatus for selectively providing program counter/data trace streams during secondary code execution when the timing trace unit is providing signal during the secondary code execution.

2. The trace apparatus as recited in claim 1 wherein secondary code execution is background/interrupt service routine code execution.

3. The trace apparatus as recited in claim 1 wherein the target processor is can have one of an unprotected pipeline and a protected pipeline.

4. The trace apparatus as recited in claim 1 further comprising a pipeline flattener, the pipeline flattener

aligning the program counter address with the completion of the instruction, the pipeline flattener flushing instructions in response to a halt execution signal in an unprotected pipeline, the pipeline flattener halting operation in a protected pipeline.

5. The trace apparatus as recited in claim 1 where in the target processor has three states, a primary code execution state, a secondary code execution state, and an execution halt state.

6. The trace apparatus as recited in claim 5 wherein the timing trace stream can be controllably enabled during an execution halt state.

7. A method of controlling trace streams in a target processor, the method comprising:

generating a timing trace stream in the target processor in response to preselected user and target processor input signals; and

when the timing trace stream is being generated, generating a program counter and a data trace stream in response to predetermined user and target processor input signals.

8. The method as recited in claim 7 further comprising including in the target processor input signals

indicia of the state of the target processor, the target processor having a primary code execution state, a secondary code execution state and an execution halt state.

9. The method as recited in claim 7 further comprising including in the target processor input signals indicia indicating whether the target processor was in a protected pipeline mode of operation or in an unprotected pipeline mode of operation.

10. The method as recited in claim 7 further comprising including in the user input signals whether the timing trace was enabled during instruction execution halts.

11. The method as recited in claim 9 further comprising including in the user input signals whether the timing trace stream was enabled during the secondary code execution state.

12. A processing unit comprising:

a central processing unit, the central processing unit having three states of operation, a primary code execution state, a secondary code execution state and an execution halted state; and

trace generating apparatus including

program counter generation and a data trace stream generation unit, the program counter trace stream generation unit and the data trace generation unit responsive to control signals for generating the program counter and the data trace streams respectively;

a timing trace stream generation unit, the timing trace stream generation unit generating a timing trace stream in response to control signals; and

a trigger unit responsive to user input signals and to central processing unit signals for generating control signals controlling the timing trace generation unit and the program counter and data trace generation unit.

13. The processing unit as recited in claim 12 wherein first control signals enable the timing trace generation unit during the secondary code execution state.

14. The processing unit as recited in claim 13 wherein second control signals enable the timing trace generation device and the program counter and data trace generation units during the secondary code execution.

15. The processing unit as recited in claim 12 including indicia of a protected pipeline mode of operation and of an unprotected mode of operation of the central

processing unit are part of the central processing unit input signals.